Circumcision and Genital Dermatoses
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Context: It is well recognized that the presence of a foreskin predisposes to penile carcinoma and sexually transmitted infections. We have investigated the relationship between the presence or absence of the foreskin and penile dermatoses.

Objective: To determine whether there is an association between circumcision and penile dermatoses.

Design: A retrospective case control study of patients attending the department of dermatology with genital skin conditions.

Subjects: The study population consisted of 357 male patients referred for diagnosis and management of genital skin disease. The control population consisted of 305 male patients without genital skin disease attending the general dermatology clinics over a 4-month period.

Main Outcome Measures: The relationship between circumcision and the presence or absence of skin disease involving the penis was investigated. The rate of circumcision in the general male dermatology population was determined.

Results: The most common diagnoses were psoriasis (n = 94), penile infections (n = 58), lichen sclerosus (n = 52), lichen planus (n = 39), seborrheic dermatitis (n = 29), and Zoon balanitis (n = 27). Less common diagnoses included squamous cell carcinoma (n = 4), Bowenoid papulosis (n = 3), and Bowen disease (n = 3). The age-adjusted odds ratio for all penile skin diseases associated with presence of the foreskin was 3.24 (95% confidence interval, 2.26-4.64). All patients with Zoon balanitis, Bowenoid papulosis, and nonspecific balanoposthitis were uncircumcised. Lichen sclerosus was diagnosed in only 1 circumcised patient. Most patients with psoriasis, lichen planus, and seborrheic eczema (72%, 69%, and 72%, respectively) were uncircumcised at presentation. Most patients with penile infections (84%) were uncircumcised.

Conclusions: Most cases of inflammatory dermatoses were diagnosed in uncircumcised men, suggesting that circumcision protects against inflammatory dermatoses. The presence of the foreskin may promote inflammation by a Koebnerization phenomenon, or the presence of infectious agents, as yet unidentified, may induce inflammation. The data suggest that circumcision prevents or protects against common infective penile dermatoses.


IT IS WELL RECOGNIZED that the presence of a foreskin predisposes to penile carcinoma1,2 and sexually acquired infection (including genital herpes, candidiasis, gonorrhea, syphilis, and human papillomavirus [HPV] infection),3 but the dermatology of the penis has attracted scant specific attention compared with that of the vulva.4 A specific clinic was started in our institution in 1993 for the assessment and research of penile dermatoses. The clinic is attended by a dermatologist (C.B.), a genitourinary physician, i.e., a physician who specializes in sexually transmitted diseases (D.H.), and a urologist (M.D.). To determine whether there is an association between circumcision and penile dermatoses, we analyzed the clinical data derived from 357 patients who presented with penile skin disease.

RESULTS

A total of 357 patients were studied. Seven patients had more than 1 diagnosis: 6 had 2 diagnoses and 1 had 3 (for a total of 365 diagnoses in the 357 men). Of 305 men without genital skin disease attending the general dermatology clinics, 146 (47.8%) were circumcised. The mean age of the subjects was 41.9 years (age range, 4-93 years): 46.1 years (range, 8-97 years) for controls (Table 1), 44.0
Two hundred ninety-four patients were seen between 1994 and 1997 within the setting of the penile dermatoses clinic at Chelsea & Westminster Hospital, London, England; 63 patients were referred from 2 other hospitals. A full history and complete dermatological assessment were carried out by the same clinician (C.B.). The presence or absence of the foreskin was specifically noted.

In cases in which diagnosis and management required histological confirmation, a 4-mm punch biopsy specimen was obtained (n = 83; 23.2%). The presence of the prepuce in the general male dermatology population (without genital disease) was assessed in 303 men attending general dermatology clinics at Chelsea & Westminster Hospital over a 4-month period in 1997.

Mean ages were compared between cases and controls and between uncircumcised and circumcised patients using unequal-variance t tests. Uncircumcised-circumcised odds ratios were calculated in 2 ways. Unadjusted odds ratios (with exact confidence intervals) were calculated using a commercially available statistical package. Age-adjusted odds ratios were calculated by logistic regression of case status with respect to foreskin presence using another commercially available statistical package. Robust confidence intervals were calculated by assigning a sampling-probability weight equal to the case-control ratio in each control’s 10-year age group.

Unadjusted and age-adjusted odds ratios for all diagnoses and each specific disease are presented in Table 2. For rare diseases, such as Bowenoid papulosis (penile intraepithelial neoplasia), the age-adjusted odds ratios were based on fewer data than were the unadjusted ones, as patients were compared with controls only in the same 10-year age groups. Infinite (∞) or 0 odds ratios arise when all patients are uncircumcised (eg, Zoon balanitis) or circumcised, respectively (eg, idiopathic penile edema). Confidence intervals are given wherever applicable, but are less exact for adjusted odds ratios than for unadjusted odds ratios. The overall unadjusted odds ratio for disease associated with presence of the foreskin was 3.08 (95% confidence interval, 2.18-4.36). Note that the odds ratio for all diseases was higher when age group was taken into account (odds ratio, 3.24; 95% confidence interval, 2.26-4.64), so the increased risk of disease in uncircumcised patients was unlikely to be attributable to confounding by age.

For the rarer diseases (from lichen simplex downward in Table 2), the confidence intervals are very wide because the cases are very few. Therefore, although the odds ratios are high for some of these rare diseases, we cannot rule out chance as the cause of the association.

The most common presenting conditions were psoriasis (n = 94); penile infections (n = 58), including HPV (n = 38), herpes simplex virus (n = 8), mollusca (n = 9), and candidal balanitis (n = 3); seborrhoeic dermatitis (n = 29); lichen sclerosus (n = 52); lichen planus (n = 39); Zoon plasma cell balanitis (n = 27); atopic eczema (n = 21); lichen simplex (n = 6); irritant contact dermatitis (n = 9); and vitiligo (n = 9). Less common diagnoses included allergic contact dermatitis (n = 3), non-specific balanoposthitis (n = 3), Bowenoid papulosis (n = 3), Bowen disease (n = 3), and idiopathic penile edema (n = 5). Of 7 patients with more than 1 diagnosis, 3 had Zoon balanitis and lichen sclerosus, 2 had lichen sclerosus and vitiligo, 1 had lichen sclerosus and lichen planus, and 1 had lichen sclerosus, Zoon balanitis and Bowenoid papulosis.

All patients with Zoon balanitis, non-specific balanoposthitis, and Bowenoid papulosis were uncircumcised (odds ratio, ∞). Most patients with lichen sclerosus were uncircumcised (98%). Lichen sclerosus was diagnosed in only 1 circumcised patient, a 30-year-old Muslim who presented with destructive balanitis xerotica obliterans. It was not possible to determine from the history whether circumcision had preceded the penile symptoms. Two other patients had persistent shaft, glans, or periurethral lichen sclerosus, despite therapeutic circumcision. One of these patients (aged 49 years at presentation) had been circumcised at the age of 8 years for phimosis. The other patient (aged 32 years at presentation) had progressive disease (balanitis xerotica obliterans) 1 year after therapeutic circumcision. Bowen disease was present in 1 circumcised patient who was aged 83 years at presentation and had been circumcised at the age of 2 years. Squamous cell carcinoma was present in 1 circumcised patient who...
was aged 78 years at presentation and had been circumcised at the age of 3 years.

The majority of men with penile infections (84%) were uncircumcised. Thirty-eight patients had HPV infection, and of these 29 (77%) were uncircumcised. Nine patients had molluscus, and of these 8 (88%) were uncircumcised. Eight patients had herpes simplex virus infection and 3 patients had candidal balanitis, and all 8 patients with these 2 infections were uncircumcised.

Most patients with psoriasis, lichen planus, and seborrheic eczema (72%, 69%, and 72%, respectively) were uncircumcised. Atopic eczema and lichen simplex were equally common in uncircumcised and circumcised patients. All patients with idiopathic penile edema were circumcised.

**COMMENT**

Circumcision is most frequently performed for religious or tribal reasons, and it is thought that approximately one sixth of the world’s male population is circumcised.7 There is a large reported variation between the rate of circumcision in the United Kingdom and that in the United States: in the United Kingdom, the cumulative rate of circumcision for boys by the age of 15 years is reported to be almost 7%,8 while in the United States the rate of circumcision among newborns is approximately 60%.9 We were surprised by the high rate of circumcision in our control population, although we could find no data on the prevalence of circumcision in the adult population of the United Kingdom for comparison. In the Jewish community, circumcision is a religious ritual and is usually performed on the eighth day of life. Religious circumcision is also practiced by Muslims between the ages of 4 and 13 years.7 Medically, circumcision is performed for phimosis and recurrent balanitis,10,11 but the literature is poor in defining causes for these nonspecific indications. In the past, both the British Medical Association12 and the American Academy of Pediatrics13 have discouraged routine circumcision of the newborn. The British General Medical Council has issued guidelines on standards of practice for physicians who are asked to perform circumcision.14

We have investigated how the presence or absence of the foreskin relates to development of penile dermatoses. The deep fold that is formed by the junction of the foreskin and the penis proximal to the the coronal sulcus is subject to maceration from epithelial debris and glandular secretions, and is a common site of infection.13 Moreover, the presence of the foreskin alters the appearance of dermatoses that are easily recognized at other sites, sometimes rendering diagnosis difficult. For example, a plaque of psoriasis on exposed glans is easily recognized but loses its characteristic scale when it is covered by the prepuce.

The spectrum of penile dermatoses seen in our study was similar to that reported from a genitourinary medicine clinic.16 In the majority of patients, a positive clinical diagnosis was obtained from formal conventional dermatological assessment, and a biopsy was not required. Our experience is that most dermatoses of the male genitalia are amenable to clinical diagnosis obtained on the classic grounds of a complete history and physical examination and that penile biopsies do not need to be performed routinely.17 Many patients with inflammatory penile dermatoses have extragenital cutaneous signs, and a complete examination is essential to achieve a firm clinical diagnosis. Patients with genital skin disease present to general practitioners or to other specialists, such as those in genitourinary medicine and urology, who may have less experience in the diagnosis of cutaneous disease. In the genitourinary

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<th>Table 2. Unadjusted and Age-Adjusted Odds Ratios (OR) and 95% Confidence Intervals (CI) for All Diagnoses*</th>
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<td>Idiopathic penile edema</td>
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*NA indicates that the OR was too high or too low to be measured; ref, reference value.†Human papillomavirus, herpes simplex virus, molluscum, and candidiasis.
medicine clinic setting, clinical diagnosis prior to biopsy has frequently been found to be inaccurate. In 1 study, the histological findings were consistent with the initial clinical diagnosis in only 20 (33%) of the 60 patients who underwent biopsy.16 When the clinical diagnosis is in doubt, a diagnostic biopsy specimen may be needed to achieve the diagnosis, and obtaining a small (4-mm) punch biopsy specimen is a simple, minimally invasive procedure. In some clinical situations, a histological diagnosis may be necessary for prognostic purposes or to advance therapeutic decision making.

Our study has shown that all patients with Zoon plasma cell balanitis were uncircumcised at presentation, a finding that is consistent with the findings of previous, smaller studies.18 The pathogenesis of Zoon balanitis is unclear, but it may represent a form of chronic irritant contact dermatitis.19 The relatively fragile skin of the glans penis is susceptible to the influence of exogenous agents, comparable with the vulva, where an increased incidence of contact dermatitis is reported.20 Circumcision cures Zoon balanitis.18

Lichen sclerosus is thought to affect the female genitalia more often than the male.21 It is likely that many cases in males remain undiagnosed because lichen sclerosus is a frequent histological finding in males who have been circumcised for other reasons.22,23 and has been found in 10% to 95% of boys who were circumcised for phimosis.24-26 Many circumcision specimens are routinely discarded without submission for histological analysis. Most authors consider lichen sclerosus of the penis synonymous with balanitis xerotica obliterans,27 but balanitis xerotica obliterans may be a consequence of other fibrosing dermatoses, such as lichen planus and cicatricial pemphigoid. The cause of lichen sclerosus remains unknown, but infection28 or a response to injury (Koebner phenomenon)29 has been postulated. There is an association with autoimmune disease, including vitiligo and alopecia areata,30 and 2 patients in our study presented with genital lichen sclerosus and vitiligo. Squamous cell carcinoma may be a complication of lichen sclerosus,31 but the risk has not been accurately quantified. Our data indicate that lichen sclerosus is very rare in circumcised individuals, although there are reports that it may follow circumcision later in life than the neonatal period or early childhood.32

The other inflammatory skin diseases (eg, psoriasis, seborrheic dermatitis, lichen planus, and allergic and irritant contact dermatitis) were all more common in uncircumcised individuals. Psoriasis and lichen planus classically manifest the Koebner phenomenon: the presence of the foreskin could facilitate minor trauma. Balanitis is a common cause for presentation at genitourinary clinics.18 The term balanoposthitis refers to inflammation of the glans penis and mucosal surface of the prepuce. It is usually caused by irritation from body fluids (eg, urine), contact with exogenous substances (eg, soaps), or infection. The low rate of diagnosis of non-specific balanoposthitis in our study may mean that many such cases are amenable to more precise dermatological diagnosis.

We found that cutaneous infections (eg, Candida, mollusca, herpes simplex virus, and HPV) were more prevalent in uncircumcised individuals: it is well known that sexually transmitted infectious genital disease is more common in uncircumcised than circumcised patients.3

Some types of HPV (ie, 16, 18, 32, and 34) have been implicated in the pathogenesis of Bowenoid papulosis,32 and all 3 of our cases involved uncircumcised patients (2 were positive for human immunodeficiency virus, while the third was in good health and negative for human immunodeficiency virus). Various HPV types (most commonly type 16) can also be found in the lesions of penile Bowen disease (intraepithelial squamous cell neoplasia).33 Of the 3 patients with Bowen disease, 2 were uncircumcised at presentation, as were 3 of the 4 patients with squamous cell carcinoma. Penile squamous cell carcinoma is extraordinarily rare in circumcised males.34 Circumcision seems to protect against squamous cell carcinoma unless the circumcision was performed for penile disease.5 The relative risk for development of penile cancer in uncircumcised males compared with those circumcised at birth has been shown to be 3.2; the risk decreases only to 3.0 for those circumcised after the neonatal period.5

CONCLUSIONS

Most cases of inflammatory dermatoses were diagnosed in uncircumcised males, suggesting that absence of the foreskin protects against penile inflammatory dermatoses. Zoon balanitis occurred only in uncircumcised patients, and lichen sclerosus developed almost exclusively in uncircumcised patients. The presence of the foreskin may promote inflammation by a Koebner phenomenon, or the presence of infectious agents, as yet unidentified, may induce inflammation. The data suggest that circumcision prevents or protects against common infective penile dermatoses.

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